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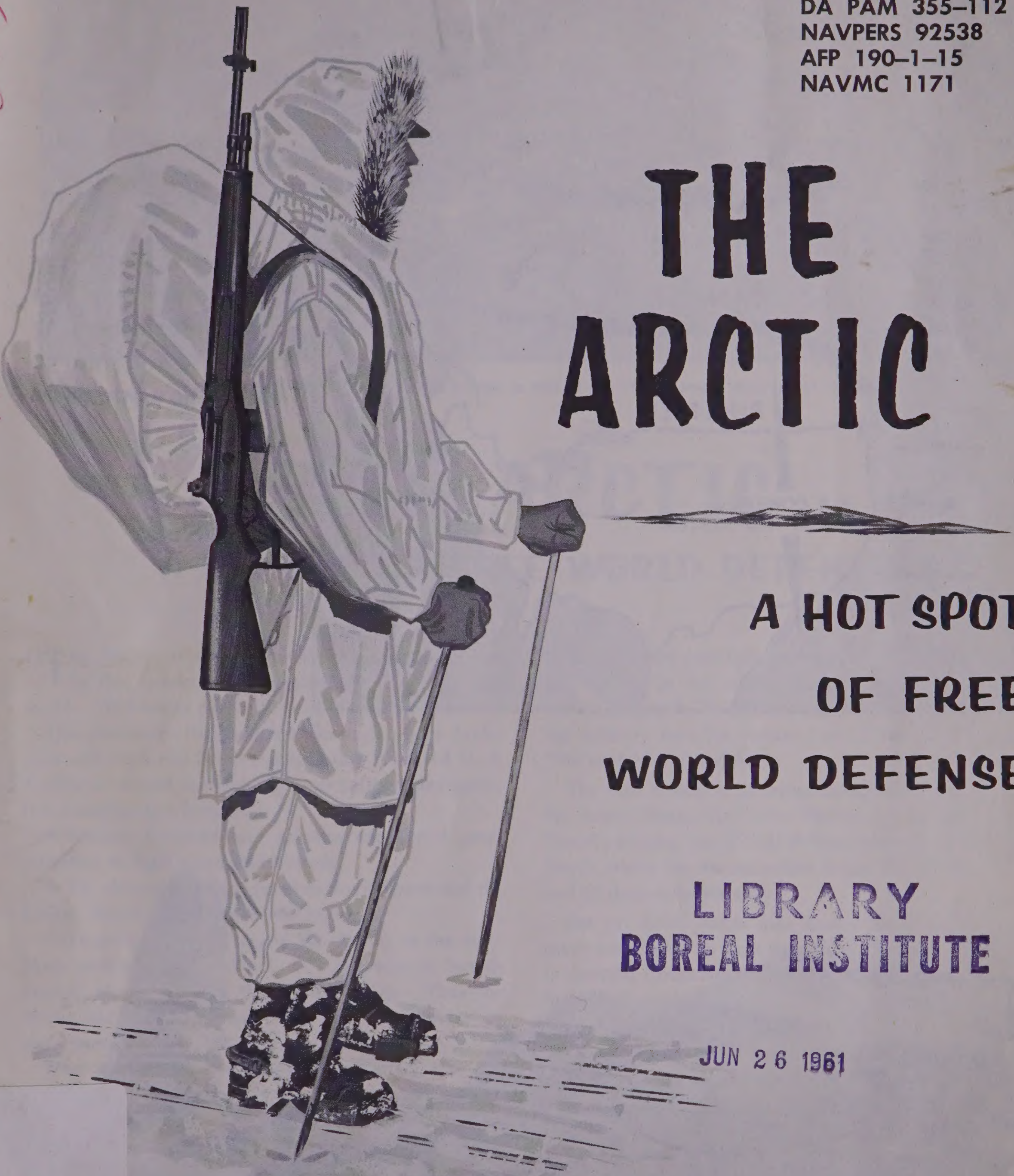

THE ARCTIC

A HOT SPOT OF FREE WORLD DEFENSE

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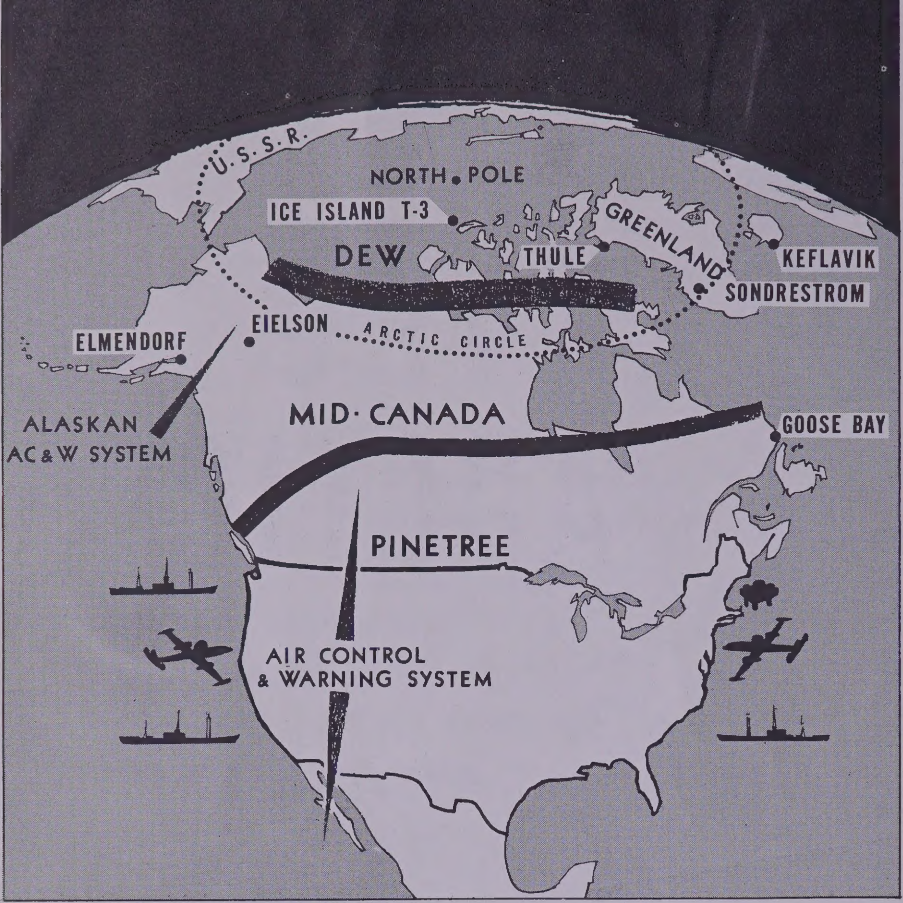

America's latter-day pioneers conquer the elements while building a defense line through the Arctic wastelands.

THE WILD BLACK YONDER. B–47s prepare to take off into Thule's months'-long winter night.

THE ARCTIC

A HOT SPOT OF FREE WORLD DEFENSE

"THE ARCTIC IS TO US what the Mediterranean was to the Greeks and Romans, the center of the world. We have to push out there for our defense."

This conclusion by the famed Norwegian-born Arctic pilot and explorer, Bernt Balchen, now a retired U. S. Air Force colonel, is shared by most military strategists. It is based on two facts:

- Modern bombers and missiles can travel great distances at high speed and altitude.
- The shortest distance between Soviet bases and the United States is over the Arctic region.

Strategists generally regard the Arctic as the most likely path of attack if the U. S. S. R. were to launch nuclear air warfare on the United States. Thus the Arctic has become a vital outpost for the defense of our country.

What are we doing to guard against attack over the Arctic has been discussed in another pamphlet.[1] Here we are concerned with how the men who must maintain this guard meet and solve the problems of Arctic conditions.

To build and man fighting bases and electronic warning stations in the vast wastelands of the Arctic is a challenging task. Even more rugged is the job of training military men for instant and effective combat on "the roof of the world."

The cold would be problem enough for elements of the Army, Navy, Air Force, Marine Corps, and Coast Guard carrying out critical defense missions in the far North where the thermometer frequently skids to 50 and 60 degrees below zero.

But our Arctic forces also must conquer such topsy-turvy conditions as days and nights that are reckoned in months, compasses that go haywire and point south instead of north, frozen lands that sweat and thaw, and runways that suddenly disappear.

Oddly enough, there is also the problem of heat, because of the brief periods in the summer when the thermometer may climb to 90 degrees or more. These erratic leaps and subsequent sharp drops of the mercury affect human efficiency and create fantastically complex engineering and maintenance problems.

Then there are such minor, but pesky, problems as swarms of carnivorous insects in summer and, for the

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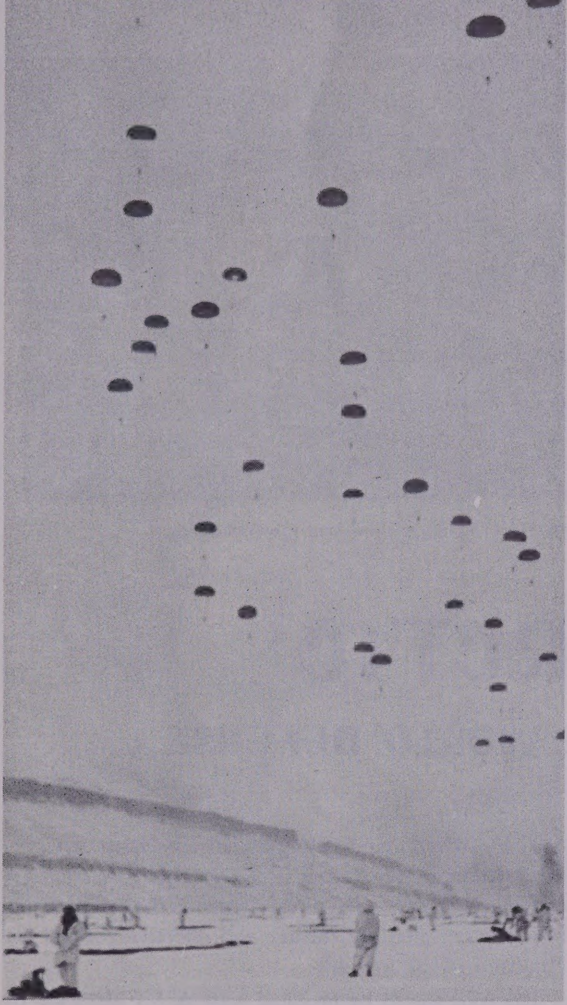
[1] DOD Pam 1–1, *Continental Air Defense* (scheduled to be revised in 1958).



GREENLAND "INVADED" by Army paratroopers. 'Chutists from the 82d Airborne Division drop on a frozen stretch of Greenland, near Thule, in simulated attack on an enemy under subzero conditions.

men on the Distant Early Warning (DEW) Line, polar bear raids on the bacon supply.

THE NORTHERN BASES

The accompanying map shows where the United States, aided by her North Atlantic Treaty Organization (NATO) allies Canada, Denmark, and Iceland, has spent hundreds of millions of dollars and deployed thousands of men to bolster Arctic defenses.

U. S. personnel in the far North perform a variety of functions: The Army has antiaircraft, engineer, and signal units throughout the Arctic and, in addition, an infantry contingent in Alaska. Since 1946 the Army has been conducting extensive cold weather tests and exercises in Alaska.

Navy aircraft and ships form extensions of the land-based DEW Line stations and perform other patrol and supply duties. Navy air units also assist in patrolling the north polar regions. Marine Corps units guard naval installations in the far North.

Air Force components of both the Strategic Air Command and the North American Air Defense Command are based in the Arctic. The Coast Guard does much of the icebreaker work for vessels plying the frigid northern waters and has land units manning Loran navigational systems stations. The Coast Guard also carries out rescue operations.

The Services hold maneuvers in the Arctic to test cold weather equipment and to prepare our forces for the rigors of fighting in that climate if circumstances require it.

Our single most important far North bastion is the mammoth Air Force base at Thule, Greenland, just 910 miles from the North Pole and squarely athwart an express route from or to the Soviet Union.

Under an agreement with Denmark, the United States operates the base at Thule and one at Sondrestrom, midway up the western coast of Greenland—the world's largest island.

These bases are linked to a network of northern military installations including Pepperrell and Ernest Harmon Air Force Bases in Newfoundland; a busy naval air base at Argentia, also in Newfoundland; Goose Bay Air Base in Labrador; and the defense forces, Keflavik, Iceland.

Stretching from bleak Baffin Island near Greenland, westward across 3,000 miles to Cape Lisburne beyond Point Barrow, Alaska, is the Air Force operated DEW line.

"Radar Picket Fence". Designed to signal the alarm of enemy aggression by day or night, the DEW Line radar picket fence, now in operation, cost the United States about $500 million to build.

South of the DEW Line in the Arctic wilderness, Canada has spent $250 million to construct the Mid-Canada Line, a radar warning backstop. Still farther south, roughly along the U. S.-Canadian border is the Pinetree System. All of these electronic listening arcs are hooked up with the combined North American Air Defense Command (NORAD) Headquarters at Ent Air Force Base, Colorado Springs, Colorado.

At Fort Churchill, on Hudson Bay in Manitoba, the

United States and Canada during the past few years have speeded up activities at a cold weather station where new weapons, including missiles, are tested for Arctic use. Fort Churchill also is playing an important role in the military's contribution to the International Geophysical Year.

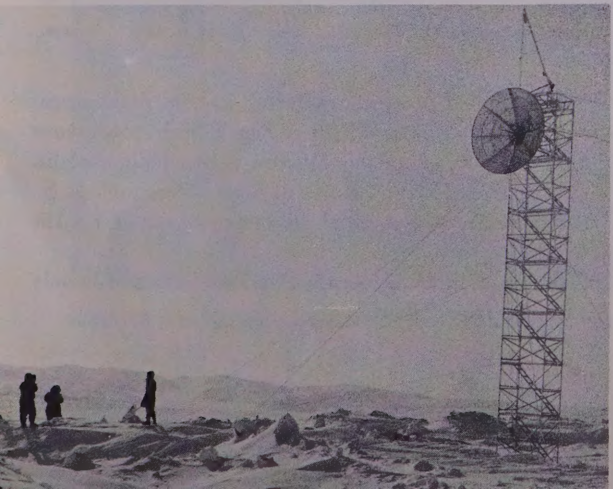
In the summer of 1957, a task group consisting of a Canadian vessel and three U. S. Coast Guard vessels found a deep-water northwest passage through previously uncharted Bellot Strait in the Canadian northwest. This new, shorter route to Baffin Bay can usually be expected to be free of impassable ice during the summer months, and is a discovery of vital importance to the maintenance of the DEW Line stations.

Alaska's New Voice. Along the western flank of our far-flung Arctic defenses, our Armed Forces are strengthening a web of air, land, and sea bases, which are kept constantly in touch and warned of any unscheduled flights by means of a new voice in the North American defense network. This is the communications system called White Alice, which speaks across hundreds of miles in Alaska with signals that are deflected from a layer of air, called the troposphere, 5 miles up from the earth's surface.

The multi-million-dollar White Alice is an expensive but vital addition to the DEW, Mid-Canada, and Pinetree Lines and to the entire NORAD warning apparatus. Her construction points up the vastly increased importance of Alaska since its purchase in 1867 from Russia at the bargain basement price of $7,200,000.

First Unified Command. The Joint Chiefs of Staff underscored the growing concern over the expansion of Soviet military power and Communist belligerency after World War II, coupled with the danger of Arctic attack, by activating the Alaskan Command on 1 January 1947 as our first unified command. (A unified command contains elements of more than one Service operating under a single commander who is appointed from the Service having the primary mission in the area.)

ARCTIC WATCHDOG. One of the numerous electronic eyes in our northern defenses is this guy-line-supported radar antenna standing bleak and desolate in snow dunes near the Gulf of Boothia.



HISTORIC DISCOVERY of Northwest Passage. Three Coast Guard ships, led by a Canadian icebreaker, make the first deep-draft transit through Bellot Strait in Canadian Arctic, 6 September 1957.

Under an Air Force commander, the Alaskan Command has headquarters at Elmendorf Air Force Base near Anchorage, Alaska's largest city. Two other major bases in Alaska are Ladd Air Force Base and Eielson Air Force Base, both in the vicinity of Fairbanks.

U. S. Army Alaska (USARAL) Headquarters are at Fort Richardson, adjacent to Elmendorf. The Army also has a busy Alaskan activity at Big Delta, where the Arctic School trains hundreds of military men for service in the far North.

The Navy's responsibilities in Alaska, carried out along treacherous coastlines and in the face of sudden and turbulent windstorms called williwaws, are under the Alaskan Sea Frontier with headquarters at Kodiak. The Navy maintains an operating base at Adak in the Aleutian Chain and an Arctic Research Laboratory at Point Barrow, the most northerly point of U. S. territory, 1,120 nautical miles from the North Pole, where the thermometer sticks below the 32-degree freezing point 265 days of the year and dips as low as 56 below zero.

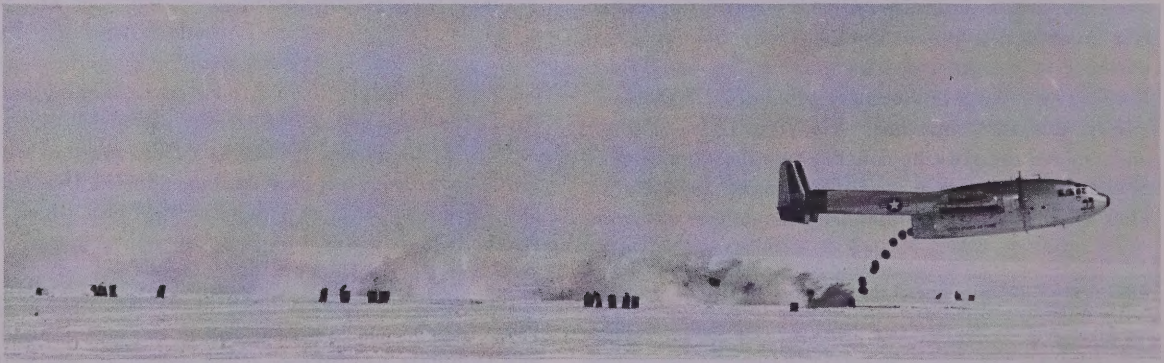
It should be pointed out, however, that except for extreme temperatures in some areas, the way of life of Americans living in Alaska is the same as that of Ameri-

CONVOY TO THULE. Barely discernible in the center of this sea of ice are ships loaded with construction materials headed toward Thule during Operation Blue Jay.

AIRMEN MOVE SUPPLIES in steel tubes that connect other steel tubes used for living and working quarters in Greenland's polar icecap.

Maintaining personnel at our northern outposts—far from supply depots—was a challenging problem for our logistics experts to solve. Part of the story of how it has been done is shown here.

SOLVING THE SUPPLY PROBLEM



AERIAL SUPPLY SYSTEM to isolated posts on Greenland's icecap is shown as this C–119 drops fuel drums along a marked course.

cans living within Continental United States. They have the same facilities and the same interests. Service personnel are encouraged to participate in community affairs in Alaska just as they do in the United States.

Alaska, like Greenland, sits astride a vital air route. This is the air lane from the U. S. S. R.'s Chukotski Peninsula to the United States. The Soviets have logged thousands of hours of flying time on the Arctic airways.

More than 20 years ago a daring 62-hour flight across the North Pole carried a three-man Soviet crew almost 6,300 miles nonstop from Moscow to San Jacinto, Calif. During World War II scores of Soviet fliers took U. S.-built combat planes north to their homeland via the Arctic.

Across the Bering Sea the Alaskan mainland is only 56 miles from Siberia.

A mere 30 seconds is all that is needed for a jet plane to flash across the less-than-5-mile channel that separates the island of Little Diomede off the coast of Alaska, which is ours, and Big Dimede, which is Soviet territory.

CHALLENGES OF THE ARCTIC

The prodigious Arctic, dominated by an ocean that is almost twice the size of the United States, two-thirds of it drifting ice pack, would be easy to describe if we could say it is the region north of the Arctic Circle.

But this isn't true. The Arctic Circle is only an imaginary line on the globe, 66 degrees, 33 minutes north latitude. Above this line the sun is visible continuously during the summer and not visible at all, because it's below the horizon, during the winter.

It is thermometer readings, however, not lines on the globe, that determine the Arctic's boundaries.

The true Arctic is the region in which the mean temperature for the warmest month is less than 50 degrees. The "polar segment"—the name given the coldest region—is where the mean temperature of the warmest month is below freezing. The sub-Arctic, another term used in connection with the far North, refers to the area that has a mean temperature above 50 degrees for more than 3 but less than 4 months a year.

It has been said the Arctic starts where the tree line stops. This is based on the theory that tree life generally cannot exist unless there is at least 1 month a year of 50-degree temperature.

What Time Is It? Keeping time in the Arctic is a struggle. Since the accepted time zones encompass areas within meridians of longitude, all joining at the North Pole, hour zones in the Arctic are compressed. Pilots moving from east to west gain immense quantities of time.

North of the Arctic Circle, the time problem becomes so complicated that men of Thule, the DEW Line, and Point Barrow cannot always be certain just what day it is. In winter, they must learn to perform their daily around-the-clock tasks despite continual darkness. In summer, they must master the technique of getting in adequate "sack drill" even if there's always a bright sun outside.

Finding the Way. Other formidable problems confront Arctic defenders. One of these is to keep from getting lost.

The ordinary magnetic compass cannot be relied on in the Arctic. Pilots, ship captains, and ground patrol leaders must compensate for the fact that the magnetic compass becomes increasingly useless as the earth's magnetic belt, several hundred miles south of the North Pole, is approached.

Going into the Thule defense area, the magnetic compass points southwest, not north. Also, at the North Pole, the latitude is 90 degrees north latitude—you cannot go any farther north—and any way you go, you'll be traveling south.

Since 1909, when Rear Admiral Robert E. Peary won a place in history as the first man to reach the North Pole, and 1926, when Rear Admiral Richard E. Byrd made his epic first flight over the Pole, great advances have been made in Arctic navigation.

Today, navigators rely heavily on the gyro compass, which is preset and then maintains direction, nothwithstanding magnetic influences, because of its constant top-like spin. Celestial navigation also is widely used in the Arctic when the heavenly bodies can be viewed.

New radar and radio navigation aids, some of them

VERSATILE WEASELS are the beasts of burden in Greenland. Here a string of Weasels hauls equipment across the snow-covered icecap.

secret, are also employed effectively in desolate areas where to get lost means to perish. Navigation difficulties in the far North required the construction, at Thule, of the second tallest building in the world, a 1,212-foot operations tower. (Height of New York City's Empire State Building is 1,472 feet.)

Crazy Mixed-Up Weather. The unsettled phenomena of the Arctic go beyond its shifting borders, the lights-on, lights-off timetables and the misbehaving compasses. There is also the matter of the frigid weather and its noticeable impact on the effectiveness of fighting forces.

Across the Arctic, jet fighter interceptors, alerted by the DEW Line or by early-warning Air Force or Navy reconnaissance aircraft, must be ready in an instant, even in weather 50 degrees below zero, to challenge the path of enemy aircraft. Army antiaircraft crews must be ready to fire their weapons in seconds, even when the thermometer tumbles to 66 below, as it has done at Fairbanks.

WINTER GARB WITH SNOWSHOES is the uniform of the day as these troops of the 71st Infantry Division "ford" Alaska's Susitna River during the Army-Air Force "Snow Bird" maneuvers.

Blasting winds that reach speeds of more than 125 miles an hour are a critical problem. Wherever U. S. servicemen are stationed in the Arctic, commanders hammer home the warning of the windchill danger.

Windchill is the combined cooling effect of wind, temperature, and relative humidity on heated human bodies.

At the Fort Churchill research station and at the Arctic School in Big Delta, instructors teach all newcomers that at 60 degrees below zero with a 5-mile-per-hour wind, skin will freeze in 1 minute, if exposed. But it also takes only 1 minute for skin to freeze if the temperature is a relatively pleasant 25 below and there is a 25-mile-per-hour wind.

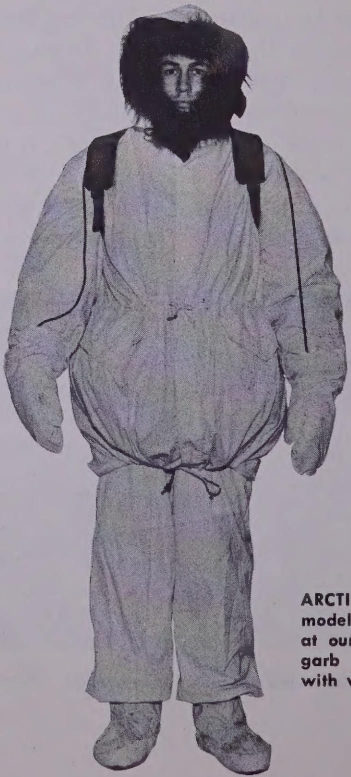
Add to the cold and the wind the fact that the highly mobile far North mercury zooms on some summer days as high as 65 above at Thule, 78 at Point Barrow and has reached a record 99 at Ladd Air Force Base.

The warm days make men perspire heavily. The land also sweats, contributing to the number one headache in Arctic construction:

Permafrost. This is the term given to the earth, ice, sludge, rock, and the like, that is frozen solid "permanently" in the Arctic. In winter, the earth's crust is a solid frozen mass extending to a depth of 1,000 feet in places.

In summer, the surface thaws to a depth of 2 to 6 feet or more. The surface then becomes a swampy bog except in areas of solid rock. The water cannot drain off or be absorbed because the earth beneath is frozen. Elaborate precautions must be taken to make sure that construction of runways, hangars, and barracks does not thaw the permafrost layer of subterranean ground in which the temperature has been below freezing.

We have licked the permafrost problem and we are overcoming the other problems of the Arctic. How we have done this dramatizes the determination and ingenuity of the fighting forces, science, and industry to



ARCTIC ENSEMBLE. This soldier models "what they're wearing" at our sub-zero outposts. His garb is the dry-cold uniform with white parka and trousers.

BUILDING OF THULE was a miracle of logistics and construction. Convoys of ships threaded through ice floes to get materials there. Above, ships ride at anchor in icy waters off Thule. Right, scene at Thule during hectic 24-hour-workday construction period.

'MODULE' EMERGES from assembly tent. Somewhere in northern Canada huge tents, such as the one above, shielded men assembling DEW line living quarters or "modules." These structures then were hitched together in "trains" and towed to their sites. At right, Navy frogman emerges from icy Arctic. Frogmen made underwater oil-hose connections during Thule buildup.

build and operate such ramparts as the Thule base and the DEW Line.

GETTING THE JOB DONE

The Communist aggression in Korea in 1950 and stepped-up military activity of the Soviet Union made it apparent to NATO leaders that a new base in some north Greenland location was urgently needed to help defend North America and to provide an advance base for a counterattack in event of a war.

The flat floor of an ancient glacier bed, rimmed on three sides by steep rock walls, frosted with snow, was the site chosen. Its location was a tiny village settled in 1909 by a Dane, Knud Rasmussen, who called it Thule.

Denmark, to which Greenland belongs, signed an agreement with the United States at Copenhagen on 27 April 1951 which permits U. S. use of facilities in Greenland " . . . in the common defense."

Operation Blue Jay. The common defense, it was decided, demanded quick action. Vast preparations were immediately started in the United States. Called "Operation Blue Jay" the Thule air base construction project involved the Army Corps of Engineers and Transportation Corps, the Military Air Transport Service and the Eighteenth Air Force of the Tactical Air Command, the U. S. Navy's Military Sea Transporta-

THULE TODAY. A summer view of that far-north, free-world bastion, Thule AFB, as seen through the eyes of a pilot landing on the airfield. The snow-free land shows little sign of the intense cold of this region in winter.

tion Service, and the Coast Guard. Thousands of civilian workers were hired, mostly construction hands from Montana and the Dakotas, accustomed to rugged weather.

The Greenlanders living near North Star Bay at Thule called the area Piktufik, which means roughly "the place where you tie the dog for a rest." They decided to move northward and wanted to take the name to the new village where they would be resettled. The Americans agreed. The name sounded too much like being in "the dog house."

Fraternization with the Greenlanders in Greenland is forbidden by arrangement between the United States and Denmark because so many of the ailments that cause only mild distress to Americans are serious and even fatal when suffered by the long-isolated people of this region.

It was decided that the base would be called Thule. This was the name used by the ancients to designate the northernmost part of Europe—in a sense, the end of the world.

Thule was anything but the end of the world in the spring of 1951 when the Air Force sent hundreds of flights there with advance work parties and equipment. As the airlift continued, more than 1,000 ships, led by Navy and Coast Guard icebreakers, were loaded with more than 350,000 tons of construction vehicles, building materials, and all manner of supplies. A 1,000-foot prefabricated dock was sent to Thule.

24-Hour Workday. Under direction of the Army Engineers, Blue Jay construction went on a 24-hour workday to take advantage of the constant summer daylight. More than 10 million cubic feet of earth and rock were moved to build a 10,000-foot runway that is 200 feet wide.

Six heavy bomber hangers, three fighter hangers, and a base maintenance hanger were built, and specially tailored barracks went up for airmen and soldiers.

Mindful of the permafrost problem, the builders of Thule's runways first removed the top cover of earth, no easy job in the face of ice and rock for bulldozer operators whose bulky shoes overlapped the pedal controls. The cover removed, a rock pad was laid down in successive layers to form a base over the permafrost. This was covered with carefully compacted layers of specially selected materials and then paved with asphalt.

ARCTIC CONSTRUCTION DIFFICULTIES

Typical of Arctic construction difficulties was the task of getting the asphalt ready for use. It froze in the drums. Engineers placed induction coils over the containers and turned on the electricity. The asphalt next to the drums became hot and the contents slipped out.

Aside from the permafrost below, the Army Engineers had to be careful that heat blasts from the Air Force jets would not damage the runway surfaces.

Small buildings were placed on footings over special pads of crushed rock three feet in thickness. A three-foot air space was left between the pad and the building floor as insulation, thereby preventing the heat from the building from thawing the ground underneath.

Larger buildings, such as hangars, required pilings, but no pile drivers were used. Holes were dug or blasted out, then were filled with rock and flooded to freeze after the piles were set in place.

In most areas of the world a construction problem is to prevent piles from sinking. In the Arctic, however, precautions must be taken so that the permafrost, as it freezes surfacewards when winter sets in, does not push the pilings out of the ground. For this reason, in the permafrost region, piles are placed in the ground "big end" first.

Reverse Refrigerator Buildings. Thule helped pioneer wide use of so-called "reverse refrigerator buildings" throughout the Arctic. These are structures made by sandwiching 3½-inch fibreglass or rockwool insulation between two sheets of quarter-inch plywood, faced with a skin of aluminum or stainless steel. Such panels called "clements," are used in building refrigerators, but in the Arctic the aim is the reverse of temperate climate usage: it is to keep the heat *inside* and the cold *outside*.

More than 3 million clements of 200 different types were used at Thule to build a modern city—it even has an AFTV television station—in a desert of ice and rock.

The project was completed in September 1952. On hand for the ceremony when the official secrecy surrounding Operation Blue Jay was raised was Odaq, a wizened old Eskimo, one of the few remaining natives who nearly half a century ago made the trek to the North Pole with Admiral Peary.

T–3 And the Lost Runway. Among the varied missions of the Thule air base is the support of a small band of Air Force members and scientists floating about in the 14,000-foot-deep Arctic Ocean on the ice island T–3, sometimes called Fletcher's Ice Island. It has drifted as close as 100 miles to the North Pole.

T–3 serves as a frontier Arctic research post, where studies are made of surface weather, solar radiation, marine biology, sea ice, and gravitational, magnetic, and oceanographic aspects of the North Pole neighborhood. It is twice the size of Bermuda— about 9 by 4½ miles—and was first spotted by radar in 1946.

T–3 undoubtedly is the only Air Force base in history that has reported, "one of our runways is missing and must be presumed lost." A 6,000-foot runway hacked out on the floating ice island to handle such heavy aircraft as the 100-ton C–124 Globemaster simply disappeared. The runway had been laid on the surface of a frozen fresh-water lake. Scientists had bored holes into the bottom of the ice island through the topside lake. When spring came, the lake—and the runway—melted and drained away through the test borings.

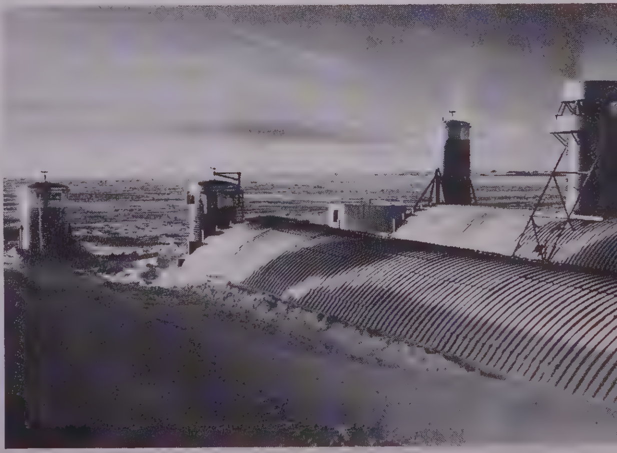
WARNING SYSTEM

Just about the time the Thule base was being built, top-level strategic studies in the United States and Canada and new warnings by the U. S.-Canadian Permanent Joint Defense Board led to a decision to push our sentinel system north beyond the Mid-Canada Line along the 55th parallel to the Distant Early Warning Line located generally along the 70th parallel.

The Army, Navy, and Air Force delivered and handled thousands of tons of building materials and detection equipment to help civilian contractors build the Arctic warning fence. Civilians, mostly Canadians, man and maintain the DEW Line stations under Air Force direction.

The buildings at each site consist of prefabricated units, or "modules," 28 feet long, 16 feet wide, and 10 feet high. The modules were assembled elsewhere and put on sleds, which were hitched together in "trains" and hauled to the sites. The main DEW Line stations have two trains, each consisting of 25 modules. Elaborate precautions are taken to prevent the spread of fire between the units of a train. In the Arctic, where water is difficult to obtain, the fire threat is more serious than in the temperate zones.

DISAPPEARING BUILDINGS on Greenland's icecap. Built by Army Engineers to house airmen on the icecap, these buildings of 18-foot steel tubes are designed to sink slowly and evenly into the snow. Entrance towers are raised in height as buildings sink.



TYPICAL DEW LINE STATION deep in Alaskan wastes. Civilians man these lonely outposts under Air Force supervision.

It's a lonely life on the DEW Line but it has its enjoyments. Hunting and fishing in that virgin territory are excellent. Mail and movies are brought in, with supplies, by aircraft that use small gravel strips near the main stations.

Living accommodations are small but comfortable, and include shower baths, modern kitchens, fluorescent lighting, and flush toilets. Indoor temperature is kept at close to 70 degrees by a cost-free system of blowers that utilize waste heat from the generators supplying power to surveillance sets.

Eskimo Allies. Scores of Eskimos helped build the DEW Line and many are helping to keep it in operation.

The DEW Line Eskimos have a veteran counterpart in the two battalions of Eskimo Scouts in Alaska, organized in 1942. On active duty always but not called to Federal Service, the Eskimo Scouts work out of headquarters at Nome and Bethel. Some Scouts are deployed on Little Diomede where they literally can keep an eye on the Communists.

The mission of the Eskimo Scouts, many of whose members are Indians, is to carry out their normal civilian pursuits of hunting, fishing, and trapping, but at the same time to keep a sharp lookout and report immediately any suspicious goings-on.

Strange footprints, markings of boat landings, the nervousness of game animals at certain times—these are perceived by the keen senses of the Scouts, interpreted and, if necessary, reported to U. S. authorities.

As everywhere in the Arctic, military men must use new tools and techniques to accomplish their mission. The tables of equipment for the Scouts now include airplanes for liaison and reconnaissance as well as kayaks and dog sleds.

ARCTIC COMBAT READINESS

Ultimately, of course, the effectiveness of our defenses in the Arctic, notwithstanding such massive bases as Thule and the ingenious communications systems, depends on the individual fighting man of all the Services. His tenacity and skill hold the key to successful employmen of new weapons against new dangers.

At Fort Churchill and at the Arctic School, the word is passed and stressed repeatedly that it is possible for a man to live and fight in the foulest type of weather provided he has the right clothing, shelter, and food, and provided also that he knows his business.

No Tight Fits. Army Quartermaster Corps Arctic experts have conducted series of intensive winter clothing tests in a Climatic Building at Natick, Massachusetts, where temperatures are dropped to 70 below, or raised to 70 above, zero. This research is backed up by field tests at Big Delta and Fort Churchill for cold-dry conditions and at Mount Washington, New Hampshire, and Camp Hale, Colorado, for cold-wet troubles.

The clothing studies show that tight fits must be avoided in the Arctic. Garments must be loose fitting to provide insulation with dead air and to permit ventilation to check perspiration.

Uniforms are worn on the layer principle. This means putting on as many layers of wool clothing as required for specific conditions, and over the wool garments, an outer shell of water repellant, wind-resistant jacket or parka.

The Arctic School teaches the fighting man that perspiration is one of his biggest problems. Mittens should be removed for a brief time before the hands begin to sweat. Innersoles are recommended to absorb perspiration from the feet.

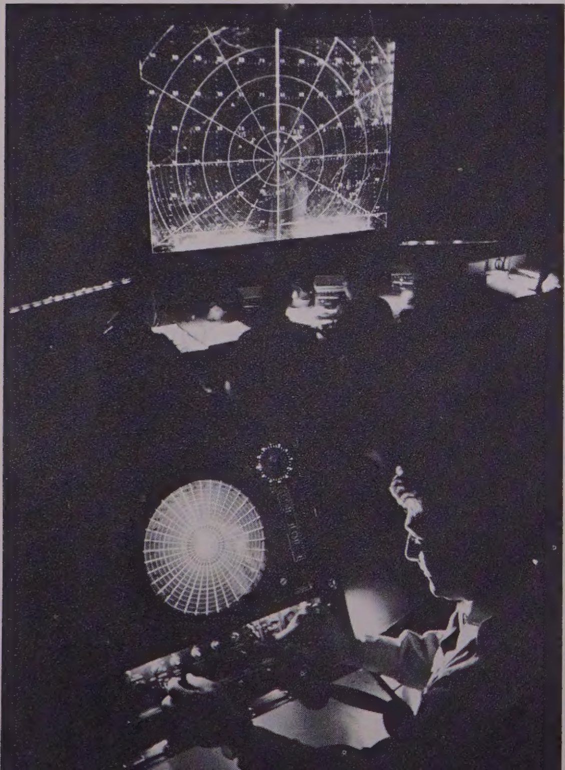
Teachers at Big Delta even show students how to breathe. In the Arctic, humans can get frosted lungs following heavy exertion or from strong winds. Soldiers on patrol, airmen working the flight line, and sailors standing Arctic watches are advised to breathe through the nose as much as possible or to warm the air around the tongue before it reaches the lungs if heavy mouth breathing is necessary.

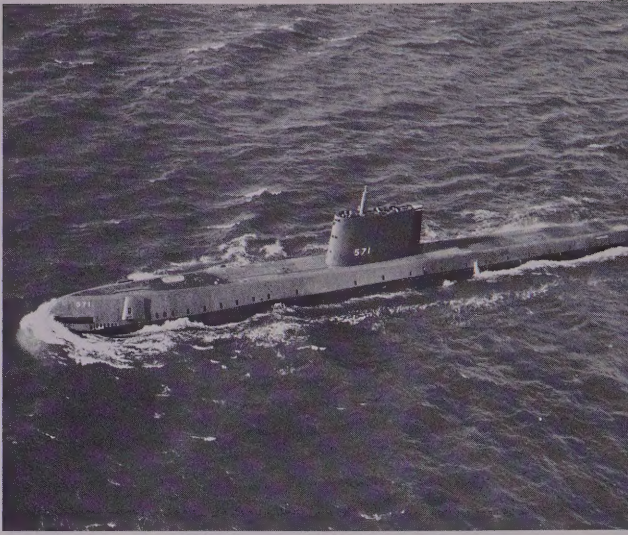
New Diet for the North. All commanders in the Arctic keep a particularly close watch on the kitchen to make certain their men are well fed. In temperate climates, a daily military ration includes about 3,600 calories. This isn't enough for cold-weather fighters; they need 4,400 calories.

Military food experts are counting on atomic radiation to help them solve the problem of providing high calory, top energy rations that require only small packages. The bill of fare for the Arctic meal of the next decade may well include partially dehydrated orange slices that are irradiated, six-ounce slices of boneless ham, and irradiated chicken thighs.

Survival Know-How. Properly clothed and adequately fed combat forces also must learn how to safeguard their health in carrying out assigned duties under all conditions. They are taught to get in the habit of moving deliberately except when speed is absolutely necessary. The cold weather soldier or airman downed in the North knows that in extreme cold there can be no quitting. Life itself can depend on the will to keep moving.

NERVE CENTER is northern aircraft control and warning station. Planes located on screen are plotted on huge board in background.





ARCTIC UNDER-ICE CRUISE was made by the atomic submarine Nautilus in 1957, when it spent 5½ days under the Arctic ice pack. It went to within 180 miles of the North Pole—farther north than any other ship—and gathered important scientific data.

Resourceful Arctic fighters try to keep a small supply of food as a last reserve and, if possible, to save an extra garment. They know that shaving and bathing are of special importance. Frost accumulates on the beard and increases the danger of freezing the face.

The Arctic School teaches construction of 10 kinds of emergency shelters from windbreaks to igloos. Survival tips in the Arctic include the fact that all kinds of animals and fish can be eaten, and that they are just as digestible raw as cooked. A general rule taught our fighters is that poisonous or indigestible vegetables can be avoided by not eating whatever tastes bitter or contains a milky sap.

Tactical Instruction. Officers and noncommissioned officers in the Arctic lose no time in teaching cold weather recruits such rudimentary facts as these: deep cold seldom accompanies a snowfall; bitter cold comes chiefly with clear, still days and nights; 2 inches of lake ice will support a single man, 6 a jeep, and 10 an empty 2½-ton truck, but greater thickness is required for loads on river ice.

ESKIMO SCOUTS, dressed in prescribed white camouflaged uniforms, go on a "combat patrol" deep in the frozen wastes of Alaska.

Ground forces learn that bright sunlight can spoil the aim of a rifleman, that mortars must be set below the snow on solid ground, and that mines must be laid on iced patches and covered with loose snow.

Six feet of snow will stop a single rifle bullet, but 15 are needed against long bursts of machinegun fire.

At many points in the Arctic, combat readiness requires that many pieces of equipment be "plugged in" to electrical outlets when not in use to prevent freezing. Army field equipment is provided with internal heaters or a mobile cold-starting accessory. Airmen on strip alerts for instant action must be wary that fuel does not become congealed.

The effort to streamline food packaging for the Arctic by atomic radiation is duplicated in the current drive to find an answer to the fuel problem. Military planners say it won't be long before portable nuclear reactors, now under development by the Army's Corps of Engineers, will be available in the far North.

THE FUTURE

The promise of irradiated rations and nuclear power dramatizes the changes that are taking place at the top of the world.

The United States and its NATO allies are hopeful that the rapidly expanding fund of knowledge about the Arctic's former mysteries can be put to work to serve all mankind in peace.

Military installations such as the Thule air base, the DEW Line, and White Alice have a potential peacetime value as aids to travel, commerce, and communications. Important information about the Arctic will be gained from International Geophysical Year research efforts, which will continue until the end of 1958 and which involve scientists from more than 60 nations including the Soviet Union.

Air Routes. We look forward to the day when more and more commercial aircraft of all nations will be flying the polar route. This route cuts 1,880 miles on a trip from Scandinavian capitals to Tokyo; 1,830 miles from Moscow to Seattle.

But for the present, confronted with the possibility of Communist attack by jet bomber, missile, submarine, or airborne assault, we must be ready to prevent an enemy from bursting through our attic and smashing against the cities of North America.

Role of the Services. We must be prepared for any contingency. The Services displayed this readiness some time ago when Army troops were dropped by the Air Force in Arctic drop zones only 809 miles from the North Pole and engaged in a tactical exercise.

We must be able, as the Navy has shown it can be, to supply such widely separated bases as Thule and Point Barrow. Now going into fleet service for this critical mission are new types of ships with stout ribbing and powerful prows against the ice pack dangers.

We must be ready, just as the Air Force is, at the first sound of alarm, to send jet interceptors streaking over the Arctic wastes. We must be ready, too, if necessary to use advance bases in the far North to strike back in defense of freedom. The cold and cruel Arctic, once the exclusive province of Eskimos, bold adventurers, and airminded prophets, has become a "hot spot" at the core of our far-flung defense effort.

The insignia of one of the Eskimo Scout units could well be the motto of all our Armed Forces. The insignia features a thunderbird and the words "Yuk Yek." They mean: "On Guard!"

THE SECRETARY OF DEFENSE
WASHINGTON

21 February 1958

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Neil McElroy

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